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(19)(CA) **APPLICATION FOR CANADIAN PATENT** (12)

(54) Fibre Reinforced Sheathing with Textured Finish

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(57) 9 Claims

ABSTRACT

A sheathing panel comprises a foamed thermosetting polymer sheet in which are dispersed reinforcing fibres or filaments. The fibres or filaments are selected from the group including fibreglass, kevlar, nylon and other fibres or filaments having sufficient tensile strength to reinforce a rigid foam panel. The thermosetting polymer is selected from the group including polyurethane, polystyrene, polyisocynate, polyisocyanurate, and other rigid setting thermoset polymers.

The present invention relates to the field of building materials, and building techniques. In particular, the present invention provides a novel reinforced foam sheathing board, and a construction technique utilizing such a board.

It is conventional for construction of a wall for a structure having an exterior facing surface to be constructed using a frame of studs, between which is packed insulation material, such as fibreglass. Sheathing, typically plywood or chip-board is nailed to the studs. A further layer of insulation in the form of a board of, for instance, polystyrene, may then be applied over the sheathing, and then a waterproofing layer may be applied followed by a finishing layer such as brick, stucco, or prefabricated siding.

There is no substantial structural drawback to the construction technique broadly outlined above, and many structures have been successfully completed according to such a technique. The external insulation layer mentioned is often excluded, because it lacks structural strength, however. Moreover, the manufacture of wood based sheathing consumes timber resources, both renewable and non-renewable.

The present invention is concerned, therefore, with both of the drawbacks to traditional stud-frame construction mentioned above: the tendency not to apply external or "added" insulation, and the desire to utilize materials other than wood to manufacture sheathing.

The problems of the present art are adhered by the present invention in that the present invention provides a novel sheathing board, to replace wooden sheathing boards. The novel board of the present invention itself has significant thermal insulating properties.

In a broad aspect, therefore, the present invention relates to a sheathing panel comprising a foamed thermosetting polymer sheet in which are dispersed reinforcing fibres or filaments.

Preferably, the said fibres or filaments are selected from the group including fibreglass, kevlar, nylon and other fibres or filaments having sufficient tensile strength to reinforce a rigid foam panel.

Moreover, the thermosetting polymer is in a preferred embodiment selected from the group including polyurethane, polystyrene, polyisocyanate, polyisocyanurate, and other rigid setting thermoset polymers.

In another broad aspect, the present invention relates to a process for manufacturing a fibre or filament reinforced foamed thermoset polymer sheathing panel, comprising the steps of: (a) arranging one or more mats of fibres or filaments in a first zone; (b) applying to said mat or mats an expanding thermoset plastic foam; (c) permitting said foam to expand, whereby said mat or mats of fibres or filaments expands with said foam to form a reinforced foam sheet; and (d) at a predetermined thickness of

foam, pressing said foam sheet to cause it to set at such thickness, whereby a smooth reinforced thermoset foam sheet is obtained.

In the process for manufacturing a fibre or filament of the present invention, the fibres or filaments are preferably selected from the group including fibreglass, kevlar, and other fibres or filaments having sufficient tensile strength to reinforce a foamed thermoset polymer.

Also, in the process for manufacturing a fibre or filament of the present invention the thermoset polymer is most effectively selected from the group including polyurethane, polystyrene, polyisocyanate, polyisocyanurate, and other thermoset polymers capable of forming a rigid sheathing board.

In a further broad aspect, a method of constructing a wall comprising the steps of: (a) erecting a frame of studs; (b) applying over that frame the sheathing panel of the present invention, or a sheating panel manufactured in accordance with the manufacturing method of the present invention; (c) applying over said panel a reinforcing mesh of fibres or filaments chosen from the group including fibreglass, kevlar, and other fibres or filaments of equivalent or higher tensile strength; and (d) applying over said reinforcing mesh two or more coatings of a cementitous, acrylic, or acrylic/cementitous mortar or parge.

The final coating of mortar or parge is architecturally textured.

Furthermore, it will be understood that the studs are made from a material selected from steel or wood.

In drawings that illustrate the present invention by way of example:

Figure 1 is a cross-sectional view of a stud-frame wall constructed with the sheathing board of the present invention, and according to the method of the present invention;

Figure 2 is a flow chart of the sheathing manufacturing technique of the present invention;

Figure 3 is a cross section view of a concrete wall finished with the sheathing board of the present invention, according to the method of the present invention;

Figure 4 is a perspective schematic of a sheathing layout according to the present invention; and

Figure 5 is a cross sectional view of an expansion joint between sheathing boards of the present invention.

Referring now to Figures 1 and 4 of the drawings, a typical application of the present invention is illustrated. A frame of studs 1, which may be either wood or steel (or other metal) in composition is provided. In the case of wooden studs, 2 X 4 or 2 X 6 fir studs are typical. In the case of steel studs, preferably cold formed galvanized sheet steel, meeting ASTM 446, hot dip galvanized or zinc coated, for corrosion resistance.

Insulating material, such as fibreglass bats, may be inserted between the studs for thermal insulation.

In a prior art installation, it will be understood that plywood or similar sheathing board will then be applied directly to the studs, and then an insulation board, optionally, over the sheathing. In the present invention, however, a sheathing board 3 that is fabricated from fibreglass (typically) reinforced expanded foam is attached directly to the stud 1 frame. As can be observed from Figure 4 the application of the sheathing boards 3 of the present invention the boards are applied in horizontal orientation, staggered so that joints are not vertically aligned. Moreover, at the outer corners of the structures, an alternating arrangement is also achieved, as may be seen in Figure 4.

The sheathing boards are attached to the studs by corrosion resistant fasteners 2, preferably conforming to ASTM C1002. Choice of a suitable fastener will, however, be obvious to one skilled in the art.

A reinforcing mesh, such as a #0040 fibreglass mesh is then fastened to the exterior surface of the sheathing board, in a smooth, and even manner. The mesh is then bonded to the face of the sheathing board by one, and preferably two applications of a preparation coat such as DuRock Prep Coat R. This is an acrylic based, cementitous coat, designed to firmly bond the fibre mesh to the sheathing board. After setting, a base coat, such as a coat of acrylic DuRock Base Coat is applied. A final

textured coat is applied over the base coat, with a finishing sealer optionally applied over the textured coat.

Referring to Figure 3, it will be seen that the sheathing board of the present invention may also be utilized with positive effect over solid concrete walls 9. In such a case, it will be observed, fibre mesh 4 is wrapped around behind the sheathing, and the aforementioned cementitous-acrylic prep-coat 5 is applied in a fairly heavy coat between the sheathing and the concrete wall.

Referring to Figure 5, it will be noted that in applications involving layer wall surfaces - for instance surfaces more than 250 sq. feet, or in applications in which there is a transition to a different building material - such as brick - a compression seal 8 is desirable. A suitable compression seal is an Emseal™ Backerseal, under compression, and coated on its external surface with a silicone sealant. The edges of the sheathing forming the joint ought to be lined with a waterproof lining.

Referring now to Figure 2, the novel manufacturing process of the present invention to fabricate the sheathing boards of the present invention is schematically illustrated. One, and preferably two, fibreglass mats are wound off of rolls to a board forming area having a smooth, flat surface. A series of spray nozzles above that surface sprays a curable expanding thermo-setting foam, such as a polystyrene or polyurethane foam into the fibreglass mats. As the foam expands, it tends to expand the

fibreglass mats, and as it expands to a predetermined thickness, it is drawn through an expansion area to a roller or the like, where it is pressed to maintain the predetermined thickness. It has been observed that the fibre from the mats expands with the foam throughout the final board and adds sufficient structural strength to permit the board of the present invention to be used without an underlying plywood or similar sheathing board.

It is to be understood that the examples described above are not meant to limit the scope of the present invention. It is expected that numerous variants will be obvious to the person skilled in the field of building materials and design and manufactur without any departure from the spirit of the invention. The appended claims, properly construed, form the only limitation upon the scope of the invention.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A sheathing panel comprising a foamed thermosetting polymer sheet in which are dispersed reinforcing fibres or filaments.

2. A sheathing panel as in Claim 1 wherein said fibres or filaments are selected from the group including fibreglass, kevlar, nylon and other fibres or filaments having sufficient tensile strength to reinforce a rigid foam panel.

3. A sheathing panel as in Claim 2, wherein said thermosetting polymer is selected from the group including polyurethane, polystyrene, polyisocynate, polyisocyanurate, and other rigid setting thermoset polymers.

4. A process for manufacturing a fibre or filament reinforced foamed thermoset polymer sheathing panel, comprising the steps of:

a) arranging one or more mats of fibres or filaments in a first zone;

b) applying to said mat or mats an expanding thermoset plastic foam;

c) permitting said foam to expand, whereby said mat or mats of fibres or filaments expands with said foam to form a reinforced foam sheet;

d) at a predetermined thickness of foam, pressing said foam sheet to cause it to set at such thickness, whereby a smooth reinforced thermoset foam sheet is obtained.

5. A process for manufacturing a fibre or filament as claimed in claim 4, wherein said fibres or filaments are selected from the group including fibreglass, kevlar, and other fibres or filaments having sufficient tensile strength to reinforce a foamed thermoset polymer.

6. A process for manufacturing a fibre or filament as claimed in Claim 5, wherein said thermoset polymer is selected from the group including polyurethane, polystyrene, polyisocyanate, polyisocyanurate, and other thermoset polymers capable of forming a rigid sheathing board.

7. A method of constructing a wall comprising the steps of:

a) erecting a frame of studs;

b) applying over that frame a sheathing panel as claimed in claim 1, 2 or 3, or manufactured in accordance with claim 4, 5 or 6;

c) applying over said panel a reinforcing mesh of fibres or filaments chosen from the group including fibreglass, kevlar, and other fibres or filaments of equivalent or higher tensile strength;

d) applying over said reinforcing mesh two or more coatings of a cementitous, acrylic, or acrylic/ cementitous mortar or parge.

8. A method of constructing a wall as claimed in Claim 7, wherein the final coating of mortar or parge is architecturally textured.

9. A method of constructing a wall as claimed in Claim 7 or 8, wherein said studs are made from a material selected from steel or wood.

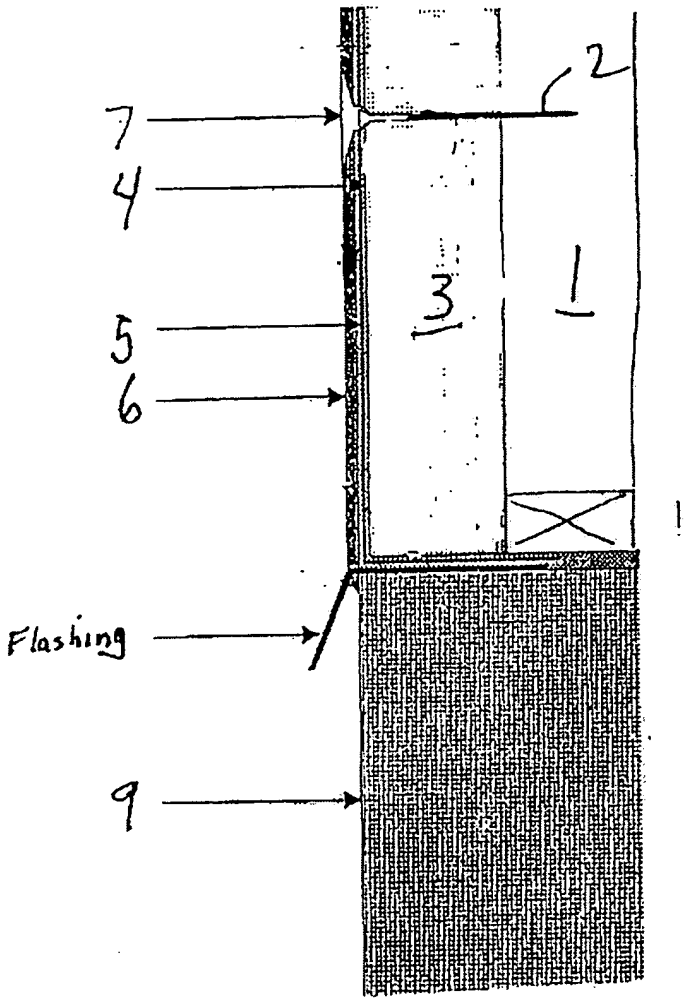
7
4
5
6
2
3
1
Flashing
9

Fig 1

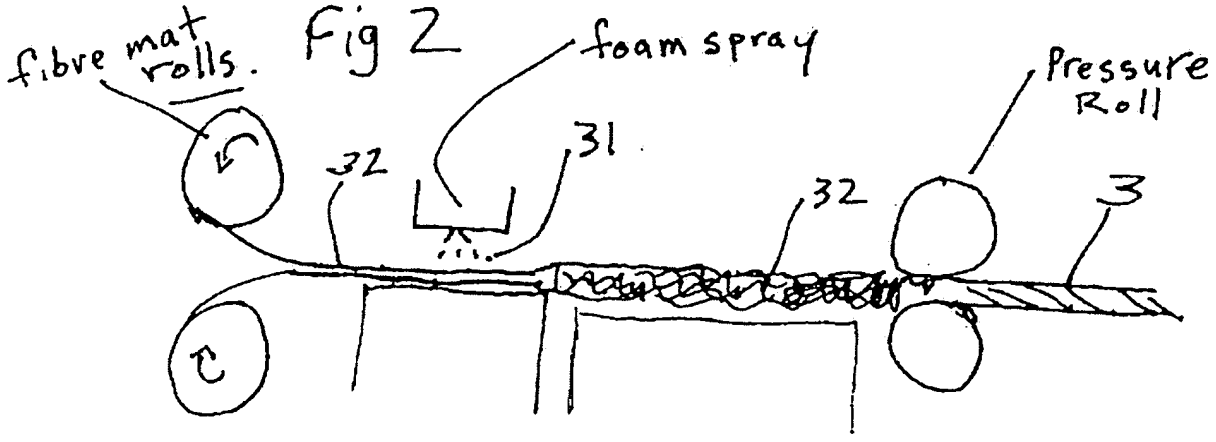
fibre mat rolls.
foam spray
Pressure Roll
32
31
32
3

Fig 2

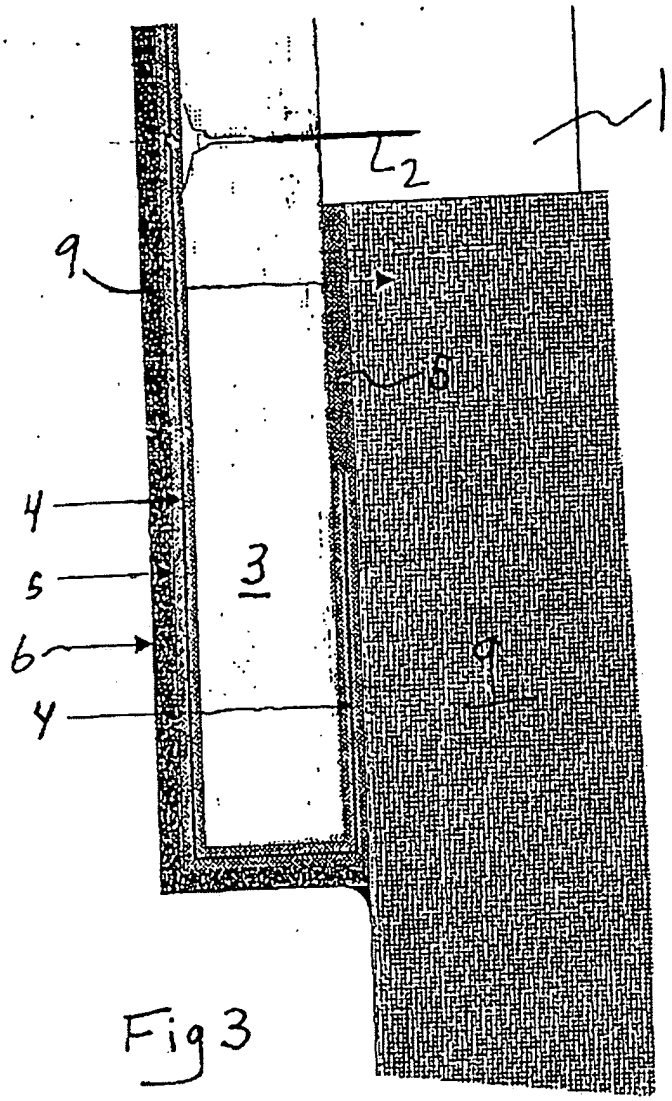

Fig 3

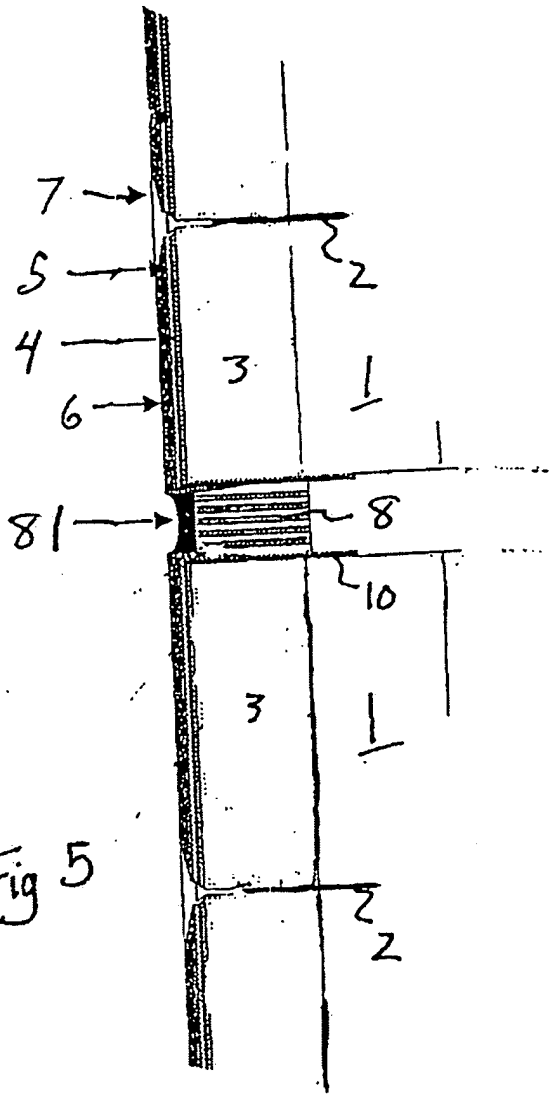

Fig 5

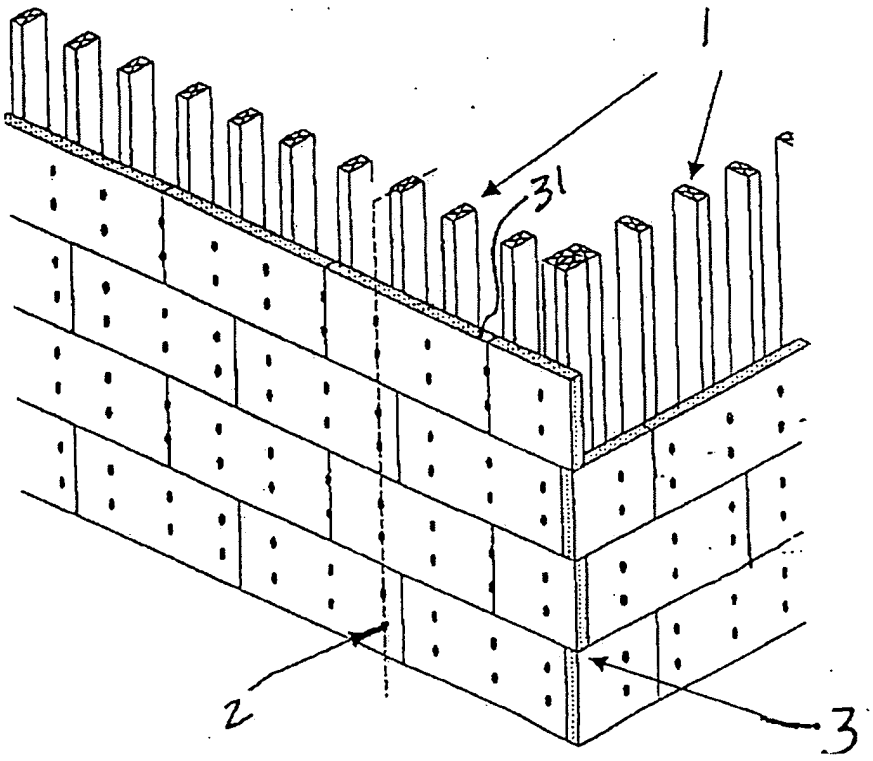

Fig 4